REMARKS

These remarks address the Office Action Mailed March 5, 2003. The Office Action objected to the Declaration, and although it is believed that the application was adequately identified in the Declaration, a newly executed declaration is being submitted herewith. Applicant has also made all of the changes to the specification requested in the Office Action, and has made appropriate changes to the claims in response to the objections to the claims.

The invention, as now claimed in amended claim 1, relates to a spectrometer that includes an array of illumination sources positioned to differently illuminate different parts of a detection area by directing a plurality of differently directed beams of light toward the detection area from different illumination source positions. An image detector is responsive to the different parts of the detection area, and a spectroscopic signal output is responsive to relative amounts of light from the different ones of the plurality of beams in different spectral regions received by the detector after interaction with the sample in the different parts of the detection area.

As presented in the summary of the invention section of the present application, differently directing beams from different source positions toward a detection area can allow precise control of sample illumination in spectrometric measurements. This is because differently directed beams can permit the spatial illumination profile generated by the array to be precisely tailored, resulting in even illumination of the sample. And a more even illumination profile can result in a more even temperature profile, which can reduce the risk of damaging the sample. Systems according to the invention can also permit deliberately uneven illumination of the sample in order to emphasize particular features.

Systems according to the invention may also allow for the efficient and/or uniform illumination of a variety of shapes. Because the output of multiple sources can be configured to evenly cover the shape of a sample, spectrometers employing differently directed beams can maximize the spectral information received from the sample. Adjusting the illumination footprint can also allow spectrometers according to the invention to efficiently and effectively monitor a number of samples at the same time.

Systems according to the invention may also allow for the reduction of information loss due to shadows in the detection area. By directing beams from different source positions toward a detection area, light can reach places in an uneven sample that might otherwise have been left in shadows. And an image of the sample will therefore include information from these regions that would not have been available from a single source.

None of the prior art of record discloses or suggests the invention as now claimed in amended claim 1. The Fateley et al. patent discloses an optical spectrophotometer that includes a diffraction grating that disperses and collimates radiation from an array of light emitting diodes, and directs selected spectral components through a slit 88, into a sample chamber 89, and on to a detector 18 (see Fig. 1). An analog-to-digital converter converts the resulting detector voltage into a digital signal, which a computer uses to solve a Hadamard algorithm to obtain intensity counts at respective wavelengths. After one analysis is performed, a motor rotates to cause a different set of wavelengths to pass through the slit, and another analysis can begin.

But nowhere do Fateley et al. disclose or suggest that the sources in their array should be positioned to differently illuminate different parts of a detection area by directing differently directed beams of light toward the detection area, nor do they disclose or suggest an image detector responsive to the differently illuminated parts of the detection area. Fateley et al. instead disclose a spectrophotometer that shines radiation through a single slit into a sample chamber, and analyses a single resulting detector voltage to produce intensity counts for different wavelengths in the radiation. But this is quite different from differently illuminating different parts of a detection area by directing differently directed beams of light toward the detection area, with an image detector that is responsive to the differently illuminated parts of the detection area. There is no disclosure or suggestion in the Fateley et al. patent of the invention as now claimed in amended claim 1.

Malin et al. disclose a method for determining the concentration of an organic blood analyte in which incident radiation containing a plurality of wavelengths is used to scan a sample. Diffusively reflected radiation emerging from the sample is detected, and

a value indicative of the concentration of the analyte is obtained using an application of chemometrics techniques.

But Malin et al. do not disclose sources positioned to differently illuminate different parts of a detection area by directing differently directed beams of light toward the detection area, nor do they disclose or suggest an image detector responsive to the differently illuminated parts of the detection area. Malin et al. instead disclose shining radiation at multiple wavelengths onto a sample and analyzing the results to obtain an analyte concentration. Like Fateley, et al., therefore, Malin et al. are only concerned with obtaining a single number from their measurements, instead of obtaining an image that includes information from differently illuminated areas. These systems therefore address significantly different problems, and fail to suggest the invention as now claimed in amended claim 1.

Bengtson discloses an optical scanning system that scans a sample on a line-by-line basis. This approach similarly fails to disclose or suggest sources positioned to differently illuminate different parts of a detection area by directing differently directed beams of light toward the detection area, nor do they disclose or suggest an image detector responsive to the differently illuminated parts of the detection area.

And the Miller patent, like the Fateley et al. patent, teaches collimating light from a variety of sources into a single optical element (see, e.g., optical fiber 14 in Fig. 1). Like the Fateley, et al. patent, therefore, the Miller patent fails to disclose directing a plurality of differently directed beams of light toward a detection area from different illumination source positions. But the Miller patent goes on to insist that it is *essential* to scramble the beam so that its output spatial pattern is free of spectral variation to the greatest extent possible. This unequivocal statement teaches away from differently illuminating different parts of a detection area by directing a plurality of differently directed beams of light toward the detection area from different illumination source positions.

Independent claims 41 and 58 as now amended also distinguish over the prior art of record for at least reasons similar to those advanced in support of claim 1. The remaining claims should be allowable for at least the reason that they depend on an allowable claim. Claim 64 has been added and its examination is respectfully requested.

This application should now be in condition for allowance, and a statement to this effect is respectfully requested. Should further questions arise concerning this application, the Examiner is invited to call Applicants' representative at the number listed below. The Commissioner is hereby authorized to charge any additional fees that may be required, or credit any overpayment, to Deposit Account No. 50-0750.

Respectfully submitted,

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